Robotics for COE Civil Works Applications

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Outline

- Project description
- Case study approach
- Mobile District
- Other case studies
- Suggestions

Objective

- **Help adapt robotic technologies to reduce costs and improve safety of inspections and maintenance in COE navigation, flood control, and hydropower applications**

- **$125k FY06**
- **Work started Mar 06**

Approach

- Compile case studies of robot use in COE Civil Works applications
  - — Project description, needs addressed
  - — Robotic technology used
  - — Outcomes
  - — *Cost-benefits & safety improvements versus traditional methods*
  - — Overall assessment
  - — Contacts (COE, industry)
- Survey robotic technologies for best-fit with COE needs
- Identify technology demonstration for FY07, select site, and scope demonstration project

Products

- White paper on potential for robotic technologies in COE Civil Works applications
  - — Summarize COE needs
  - — Compile existing robotic capabilities
  - — Summarize case studies & lessons learned
  - — Identify technology gaps
  - — Develop R&D plan to increase robot utilization
  - — Estimate potential cost-benefit and safety improvements
- Case study archive

ERDC-CRREL Role

- Agent to compile and disseminate case studies, inform District personnel of opportunities and appropriate technology
- Technical assessments, cost-benefit analyses, R&D to fill gaps
- Honest broker to link industry capabilities with District needs

Case Studies

Existing COE applications - ROV's

- Lock & dam, hydro facilities
- Equipment, frequency, type of use
- Cost & safety benefits vs alternatives
- How was ROV originally justified?
- Future use & capabilities needed

- Cost/benefit analysis can help District justify & expand use

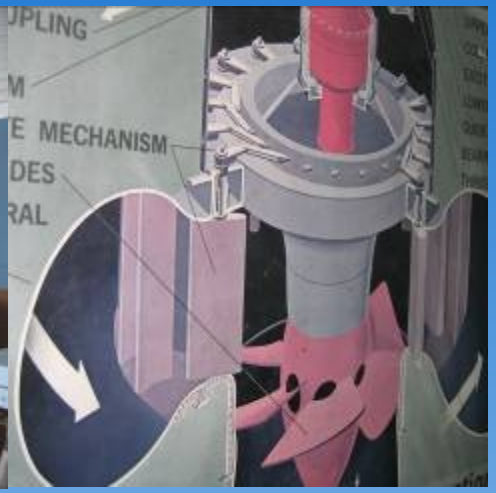
Mobile District – Millers Ferry

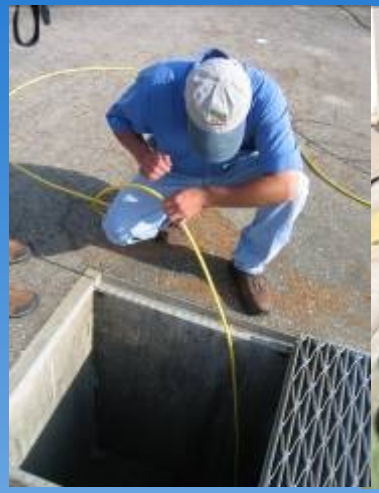
POC: Jeff Byars ROV: VideoRay Site visit: 11-12 April 06

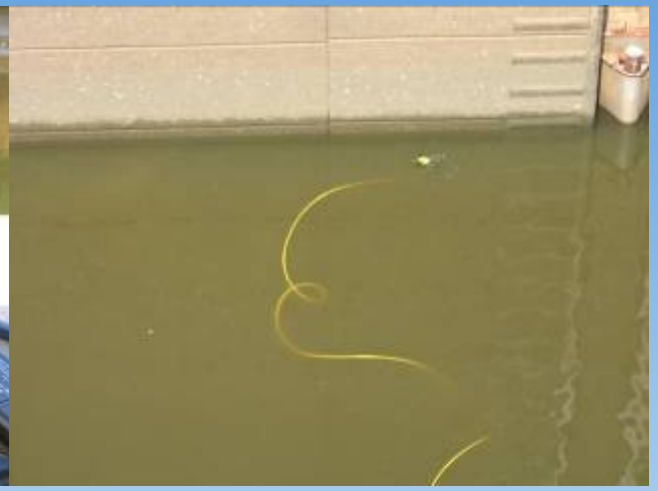
Millers Ferry & Jamie Whitten

- ROV use
  - Inspection of conduits
  - Debris location/removal on stop log sills (~10 times/yr)
  - Inspection and clearing of turbine service gate seats
  - Recover of submerged debris
  - Recovery of sunken floating moorings
  - Checking beaches before opening for season
  - Inspection of turbine wicket gates
- Much faster mobilization than divers
- Tight access no problem
- Safety & administrative benefits
- ~ $70k/yr savings vs divers (+ ad hoc inspections)
- ROV cost ~ $30k

Millers Ferry







Other Case Studies

Sault Ste. Marie

- 2 – 4 May 06
- Lock, dam & hydro facilities
- ROV: 10+ yrs old, want new one (inspections & surveys)
- POC: Ed Hallquist

Seattle District

- mid-May 06
- 7 lock, dam & hydro facilities
- ROV: Deep Ocean Phantom
- POC: Dennis Fischer

Chelan County Public Utility District

- mid-May 06
- 2 hydro facilities
- ROV’s: Deep Ocean Phantom & custom ROV

Needs - Preliminary

- Navigation
  - re-positioning accuracy
  - 3-D mapping into CAD
- High quality images
  - visual, sonar
- Image scaling
  - deterioration assessment, design solutions
- More thrust
  - currents, cable towing

Suggestions?

- **Other case studies**
- **New imaging/navigation technology**
- **Other applications**
  - — cleaning, painting, debris removal, hazardous cleanup, levee inspections
- **Thanks**